

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended) A recording apparatus for digitally recording on a recording medium a bit stream comprising a video signal and an audio signal which are coded by utilizing the correlation between screens, said apparatus comprising:

normal play recording data generation means for generating, from the bit stream, normal play recording data which is used when a normal reproduction is performed and which is composed of a plurality of predetermined recording blocks;

trick play recording data generation means for generating, from the bit stream, trick play recording data which is used when a trick play reproduction at a speed different from a speed for the normal reproduction is performed and which is composed of a plurality of predetermined recording blocks by adding received information;

packet generation means for generating a time information packet representing time information for managing the time when a reproduced image is outputted and a control information packet representing control information for decoding the trick play recording data, and outputting the time information packet and the control information packet to said trick play recording data generation means, wherein said trick play recording data generation means adds the time information and the control information respectively represented in the outputted time information packet and the control information packet so as to generate the trick play recording data;

recording means for recording, through a recording head, the normal play recording data in a normal play area to be organized on the recording medium and the trick play recording data in a trick play area to be organized on the recording medium, wherein

said trick play recording data generation means stores the trick play image data extracted from the bit stream in order in one memory, reads out the trick play image data stored in the one memory in a backward direction, which is the same direction in which the trick play image data was stored in the one memory ~~recorded by said recording means~~, so as to generate trick play recording data for fast forward reproduction, and reads out the trick play image data stored in the one memory in a forward direction, which is the opposite direction in which the trick play image data was stored in the one

~~memory recorded by said recording means~~, so as to generate trick play recording data for backward reproduction, and

said recording means records the time information packet and the control information packet which are outputted from said packet generation means at predetermined positions inside the trick play area, respectively, in a format of the trick play recording data.

Claim 2 (Previously Presented) The recording apparatus according to claim 1, wherein the predetermined positions are provided on the recording medium in such a manner so as to be arranged at least once within a predetermined time interval in synchronization with the scanning of the recording head at the time of trick play reproduction at a predetermined number of times the speed at the time of normal reproduction.

Claim 3 (Previously Presented) The recording apparatus according to claim 1, wherein said packet generation means generates the time information representing a time reference value within the predetermined time interval, and adds a predetermined fixed value corresponding to the predetermined position inside the trick play area at which the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 4 (Previously Presented) The recording apparatus according to claim 2, wherein said packet generation means generates the time information representing a time reference value within the predetermined time interval, and adds a predetermined fixed value corresponding to the predetermined position inside the trick play area at which the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 5 (Previously Presented) The recording apparatus according to claim 1, wherein the time information for managing the time when a reproduced image is outputted is found from the time reference value to be the basis of the time information and the

amount of the trick play image data that is extracted from the bit stream to be inputted,
and

the time information is a value which is subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 6 (Previously Presented) The recording apparatus according to claim 4, wherein the time information for managing the time when a reproduced image is outputted is found from the time reference value to be the basis of the time information and the amount of the trick play image data that is extracted from the bit stream to be inputted,
and

the time information is a value which is subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 7 (Previously Presented) The recording apparatus according to claim 1, wherein the time information to be added to the trick play image data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with a recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 8 (Previously Presented) The recording apparatus according to claim 6, wherein the time information to be added to the trick play image data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with the recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 9 (Previously Presented) The recording apparatus according to claim 1, wherein control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between the screens represents an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play data recorded on the trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from the bit stream.

Claim 10 (Previously Presented) The recording apparatus according to claim 8, wherein

control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between the screens indicates an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play data recorded on said trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from said bit stream.

Claims 11 and 12 (Cancelled)

Claim 13 (Previously Presented) The recording apparatus according to claim 1, wherein

said packet generation means further generates and outputs a Null packet that is invalid data in an MPEG standard, and

said trick play recording data generation means inserts, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet outputted by said packet generation means into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 14 (Previously Presented) The recording apparatus according to claim 10, wherein

said packet generation means further generates and outputs a Null packet that is invalid data in an MPEG standard, and

said trick play recording data generation means inserts, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet outputted by said packet generation means into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 15 (Previously Presented) The recording apparatus according to claim 1, wherein said trick play recording data generation means inserts, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, a dummy sync block that is invalid data in a D-VHS standard into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 16 (Previously Presented) The recording apparatus according to claim 1, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said apparatus further comprises:

header analysis means for analyzing a PES header included in the bit stream;

DSM trick mode flag setting means for setting, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;

memory means for storing the trick play data extracted from the bit stream as well as previously ensuring a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and previously ensuring the trick mode field at a predetermined position in the PES header of the bit stream; and

trick mode field value insertion means for inserting, when the data is read out of said memory means, predetermined data representing trick play conditions into the trick mode field.

Claim 17 (Previously Presented) The recording apparatus according to claim 14, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said apparatus further comprises:

header analysis means for analyzing a PES header included in the bit stream;

DSM trick mode flag setting means for setting, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;

memory means for storing the trick play data extracted from the bit stream as well as previously ensuring a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and previously ensuring the trick mode field at a predetermined position in the PES header of the bit stream; and

trick mode field value insertion means for inserting, when the data is read out of said memory means, predetermined data representing trick play conditions into the trick mode field.

Claim 18 (Previously Presented) The recording apparatus according to claim 1, wherein the bit stream comprising a video signal and an audio signal which are coded by utilizing the correlation between screens is coded data by an MPEG system.

Claims 19 to 27 (Cancelled)

Claim 28 (Currently Amended) A recording method for digitally recording on a recording medium a bit stream comprising a video signal and an audio signal which are coded by utilizing the correlation between screens, said method comprising:

generating, from the bit stream, normal play recording data to be inputted which is used when a normal reproduction is performed and which is composed of a plurality of predetermined recording blocks;

generating a time information packet representing time information for managing the time when a reproduced image is outputted and a control information packet representing control information for decoding trick play recording data;

generating, from the bit stream, the trick play recording data which is used when a trick play reproduction at a speed different from a speed for the normal reproduction is performed and which is composed of a plurality of predetermined recording blocks by adding the time information packet and the control information packet; and

recording, through a recording head, the normal play recording data in a normal play area to be organized on the recording medium and the trick play recording data in a trick play area to be organized on the recording medium, and respectively recording the time information packet and the control information packet at predetermined positions inside the trick play area in a format of the trick play recording data;

wherein, in said generating of the trick play recording data, the trick play image data extracted from the bit stream is stored in order in one memory, the trick play image data stored in the one memory is read out in a backward direction, which is the same direction in which trick play image data is ~~recorded~~ stored in the one memory, so as to generate trick play recording data for fast forward reproduction, and the trick play image data stored in the one memory is read out in a forward direction, which is the opposite

direction in which the trick play image data is ~~recorded~~stored in the one memory, so as to generate trick play recording data for backward reproduction.

Claim 29 (Previously Presented) The recording method according to claim 28, wherein the predetermined positions are provided on the recording medium in such a manner so as to be arranged at least once within a predetermined time interval in synchronization with the scanning of the recording head at the time of trick play reproduction at a predetermined number of times the speed at the time of normal reproduction.

Claim 30 (Previously Presented) The recording method according to claim 28, further comprising generating the time information representing a time reference value within the predetermined time interval, and adding a predetermined fixed value corresponding to the predetermined position inside the trick play area where the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 31 (Previously Presented) The recording method according to claim 29, further comprising generating the time information representing a time reference value within the predetermined time interval, and adding a predetermined fixed value corresponding to the predetermined position inside the trick play area where the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 32 (Previously Presented) The recording method according to claim 28, wherein the time information for managing the time when a reproduced image is outputted is found from the time reference value to be the basis of the time information and the amount of the trick play image data that is extracted from the bit stream to be inputted, and

the time information is a value which is subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 33 (Previously Presented) The recording method according to claim 31, wherein the time information for managing the time when a reproduced image is found is outputted from the time reference value to be the basis of the time information and the amount of the trick play image data that is extracted from the bit stream to be inputted, and

the time information is a value subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 34 (Previously Presented) The recording method according to claim 28, wherein the time information to be added to the trick play recording data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with a recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 35 (Previously Presented) The recording method according to claim 33, wherein the time information to be added to the trick play recording data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with a recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 36 (Previously Presented) The recording method according to claim 28, wherein control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between screens

represents an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play recorded on the trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from said bit stream.

Claim 37 (Previously Presented) The recording method according to claim 35, wherein control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between screens represents an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play recorded on the trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from said bit stream.

Claims 38 and 39 (Cancelled)

Claim 40 (Previously Presented) The recording method according to claim 28, further comprising generating a Null packet that is invalid data in an MPEG standard,

wherein in said generating of the trick play recording data, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet generated in said generating of the Null packet is inserted into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 41 (Previously Presented) The recording method according to claim 37, further comprising generating a Null packet that is invalid data in an MPEG standard,

wherein in said generating of the trick play recording data, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet generated in said generating of the Null packet is inserted into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 42 (Previously Presented) The recording method according to claim 28, wherein in said generating of the trick play recording data, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, a dummy sync block that is invalid data in a D-VHS standard is inserted into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are respectively less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 43 (Previously Presented) The recording method according to claim 28, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said method further comprises:

analyzing a PES header included in the bit stream;

setting, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;

storing the trick play data extracted from the bit stream as well as previously ensuring a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and previously ensuring the trick mode field at the predetermined position in the PES header of the bit stream; and

inserting, when the data is read out at said ensuring and thereafter, predetermined data representing trick play conditions into the trick mode field.

Claim 44 (Previously Presented) The recording method according to claim 41, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said method further comprises:

- analyzing a PES header included in the bit stream;
- setting, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;
- storing trick play data extracted from the bit stream as well as previously ensuring a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and previously ensuring the trick mode field at the predetermined position in the PES header of the bit stream; and
- inserting, when data is read out at said ensuring and thereafter, predetermined data representing trick play conditions into the trick mode field.

Claim 45 (Previously Presented) The recording method according to claim 28, wherein the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between screens is coded data by an MPEG system.

Claims 46 to 54 (Cancelled)

Claim 55 (Currently Amended) A recording apparatus for digitally recording on a recording medium a bit stream comprising a video signal and an audio signal which are coded by utilizing the correlation between screens, said apparatus comprising:

- a normal play recording data generation unit operable to generate, from the bit stream, normal play recording data which is used when a normal reproduction is performed and which is composed of a plurality of predetermined recording blocks;
- a trick play recording data generation unit operable to generate, from the bit stream, trick play recording data which is used when a trick play reproduction at a speed different from a speed for the normal reproduction is performed and which is composed of a plurality of predetermined recording blocks by adding received information;

a packet generation unit operable to generate a time information packet representing time information for managing the time when a reproduced image is outputted and a control information packet representing control information for decoding the trick play recording data, and to output the time information packet and the control information packet to said trick play recording data generation unit, wherein said trick play recording data generation unit is operable to add the time information and the control information respectively represented in the outputted time information packet and the control information packet so as to generate the trick play recording data;

a recording unit operable to record, through a recording head, the normal play recording data in a normal play area to be organized on the recording medium and the trick play recording data in a trick play area to be organized on the recording medium, wherein

said trick play recording data generation unit is operable to store the trick play image data extracted from the bit stream in order in one memory, to read out the trick play image data stored in the one memory in a backward direction, which is the same direction in which the trick play image data was stored in the one memory~~recorded by said recording unit~~, so as to generate trick play recording data for fast forward reproduction, and to read out the trick play image data stored in the one memory in a forward direction, which is the opposite direction in which the trick play image data was stored in the one memory~~recorded by said recording unit~~, so as to generate trick play recording data for backward reproduction, and

said recording unit is operable to record the time information packet and the control information packet which are outputted from said packet generation unit at predetermined positions inside the trick play area, respectively, in a format of the trick play recording data.

Claim 56 (Previously Presented) The recording apparatus according to claim 55, wherein the predetermined positions are provided on the recording medium in such a manner so as to be arranged at least once within a predetermined time interval in synchronization with the scanning of the recording head at the time of trick play

reproduction at a predetermined number of times the speed at the time of normal reproduction.

Claim 57 (Previously Presented) The recording apparatus according to claim 55, wherein said packet generation unit is operable to generate the time information representing a time reference value within the predetermined time interval, and to add a predetermined fixed value corresponding to the predetermined position inside the trick play area at which the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 58 (Previously Presented) The recording apparatus according to claim 56, wherein said packet generation unit is operable to generate the time information representing a time reference value within the predetermined time interval, and to add a predetermined fixed value corresponding to the predetermined position inside the trick play area at which the time information is recorded to the previous time information so as to calculate the time reference value.

Claim 59 (Previously Presented) The recording apparatus according to claim 55, wherein the time information for managing the time when a reproduced image is outputted is found from the time reference value to be the basis of the time information and the amount of the trick play image data that is extracted from the bit stream to be inputted, and

the time information is a value which is subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 60 (Previously Presented) The recording apparatus according to claim 58, wherein

the time information for managing the time when a reproduced image is outputted is found from the time reference value to be the basis of the time information and the

amount of the trick play image data that is extracted from the bit stream to be inputted,
and

the time information is a value which is subsequent to the time reference value at which data representing the end of the trick play image data is outputted and normalized based on a frame update period on an image display device for displaying the trick play image data.

Claim 61 (Previously Presented) The recording apparatus according to claim 55,
wherein

the time information to be added to the trick play image data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with a recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 62 (Previously Presented) The recording apparatus according to claim 60,
wherein

the time information to be added to the trick play image data is a time stamp value required to output, at the time of trick play reproduction, a trickily played stream at a time interval inputted at the time of recording, and

the time stamp value is a fixed value which is synchronized with the recording track on the recording medium and corresponds to a trick play sync block number which is indicated in header information of each of the plurality of predetermined recording blocks composing the trick play recording data.

Claim 63 (Previously Presented) The recording apparatus according to claim 55,
wherein

control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between the

screens represents an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play data recorded on the trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from the bit stream.

Claim 64 (Previously Presented) The recording apparatus according to claim 62, wherein

control information which is required to decode the bit stream comprising the video signal and the audio signal which are coded by utilizing the correlation between the screens indicates an identification number for identifying the structure of the bit stream and the content of data composing the bit stream, and

the control information for trick play data recorded on said trick play area to be organized on the recording medium is information which depends on the control information which is included in the bit stream to be inputted and excludes the identification number relating to data which is not required to generate the trick play recording data, which is not extracted from said bit stream.

Claim 65 (Previously Presented) The recording apparatus according to claim 55, wherein

said packet generation unit is further operable to generate and output a Null packet that is invalid data in an MPEG standard, and

said trick play recording data generation unit is operable to insert, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet outputted by said packet generation unit into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 66 (Previously Presented) The recording apparatus according to claim 64, wherein

said packet generation unit is further operable to generate and output a Null packet that is invalid data in an MPEG standard, and

said trick play recording data generation unit is operable to insert, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, the Null packet outputted by said packet generation unit into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 67 (Previously Presented) The recording apparatus according to claim 55, wherein said trick play recording data generation unit is operable to insert, in generating the trick play recording data for fast forward reproduction and backward reproduction from the trick play image data stored in the one memory, a dummy sync block that is invalid data in a D-VHS standard into the trick play recording data in order to compensate, when the amounts of the respective trick play recording data to be generated are less than predetermined amounts, for insufficient amounts so as to fill the trick play area.

Claim 68 (Previously Presented) The recording apparatus according to claim 55, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said apparatus further comprises:

a header analysis unit operable to analyze a PES header included in the bit stream;

a DSM trick mode flag setting unit operable to set, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;

a memory operable to store the trick play data extracted from the bit stream as well as to previously ensure a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and to previously ensure the trick mode field at a predetermined position in the PES header of the bit stream; and

a trick mode field value insertion unit operable to insert, when the data is read out of said memory, predetermined data representing trick play conditions into the trick mode field.

Claim 69 (Previously Presented) The recording apparatus according to claim 66, wherein when the bit stream to be inputted is a bit stream conforming to an MPEG standard, said apparatus further comprises:

a header analysis unit operable to analyze a PES header included in the bit stream;

a DSM trick mode flag setting unit operable to set, to a predetermined value, a DSM trick mode flag in a PES header indicating that the bit stream is trick play data;

a memory operable to store the trick play data extracted from the bit stream as well as to previously ensure a 1-byte area for a trick mode field at a predetermined address so as to insert the trick mode field into a predetermined position of the trick play data, and to previously ensure the trick mode field at a predetermined position in the PES header of the bit stream; and

a trick mode field value insertion unit operable to insert, when the data is read out of said memory, predetermined data representing trick play conditions into the trick mode field.

Claim 70 (Previously Presented) The recording apparatus according to claim 55, wherein the bit stream comprising a video signal and an audio signal which are coded by utilizing the correlation between screens is coded data by an MPEG system.